DRINKING WATER SURVEILLANCE PROGRAM

NIAGARA FALLS WATER TREATMENT PLANT

ANNUAL REPORT 1990

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NIAGARA FALLS
WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE PROGRAM

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

NIAGARA FALLS WATER TREATMENT PLANT
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 supplies were being monitored.

The Niagara Falls water treatment plant is a conventional treatment plant which treats water from the Niagara River at the junction of Welland River. The process consists of coagulation, flocculation, sedimentation, filtration, taste and odour control and disinfection. This plant has a rated capacity of 145.475 x 1000 m^3/day. The Niagara Falls water treatment plant serves a population of approximately 67,700.

Water at the plant and at three locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Niagara Falls water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

93-02442/

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE RAW TESTS	SITE RAW POSITIVE	SITE RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE	SITE 1 TESTS	SITE 1 POSITIVE	SITE 1 %POSITIVE	SITE 2 TESTS	SITE 2 POSITIVE	SITE 2 %POSITIVE	SITE 3 TESTS	SITE 3 POSITIVE	SITE 3 %POSITIVE
BACTERIOLOGICAL	15	13	86	5	0	0	4	0	0	4	0	0	4	0	0
CHEMISTRY (FLD)	18	18	100	36	36	100	60	59	98	60	34	56	60	57	95
CHEMISTRY (LAB)	132	107	81	131	93	70	188	162	86	190	163	85	189	161	85
METALS	144	45	31	144	40	27	230	93	40	230	100	43	230	85	36
CHLOROAROMATICS	84	0	0	84	0	0	70	0	0	70	0	0	70	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.	.	.	.	.	.	.
PAH	102	0	0	102	0	0	17	0	0	17	0	0	.	.	.
PESTICIDES & PCB	203	0	0	203	0	0	105	0	0	106	0	0	106	0	0
PHENOLICS	6	0	0	6	0	0	.	.	.	.	.	.	.	.	.
SPECIFIC PESTICIDES	58	0	0	58	0	0	5	0	0	5	0	0	5	0	0
VOLATILES	174	0	0	174	24	13	145	20	13	87	12	13	116	16	13
TOTAL	948	183		955	193		824	334		769	309		780	319	

DRINKING WATER SURVEILLANCE PROGRAM

NIAGARA FALLS WATER TREATMENT PLANT
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 supplies were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Niagara Falls water treatment plant in the spring of 1986. Previous annual reports have been published for 1986, 1987, 1988, and 1989.

PLANT DESCRIPTION

The Niagara Falls water treatment plant is a conventional treatment plant which treats water from the Niagara River at the junction of the Welland River. The process consists of coagulation, flocculation, sedimentation, filtration, taste and odour control and disinfection. This plant has a rated capacity of 145.475 x 1000 m^3/day. The Niagara Falls water treatment plant serves a population of approximately 67,700.

The sample day flows ranged from 48.260 x 1000 m^3/day to 71.149 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the

plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were reported above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of delivered water may increase in the distribution system due to the warming effect of the soil in

late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 5 of 21 treated and distributed water samples with a maximum reported value of 22.1°C.

CHEMISTRY (LAB)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 21 of 21 treated and distributed water samples with a maximum reported value of 138.8 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 5 of 16 treated and distribution water samples with a maximum reported value of 200.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results were reported above trace levels.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 18 treated and distributed water samples analyzed with a maximum level of 35.7 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Niagara Falls water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

NIAGARA FALLS WTP

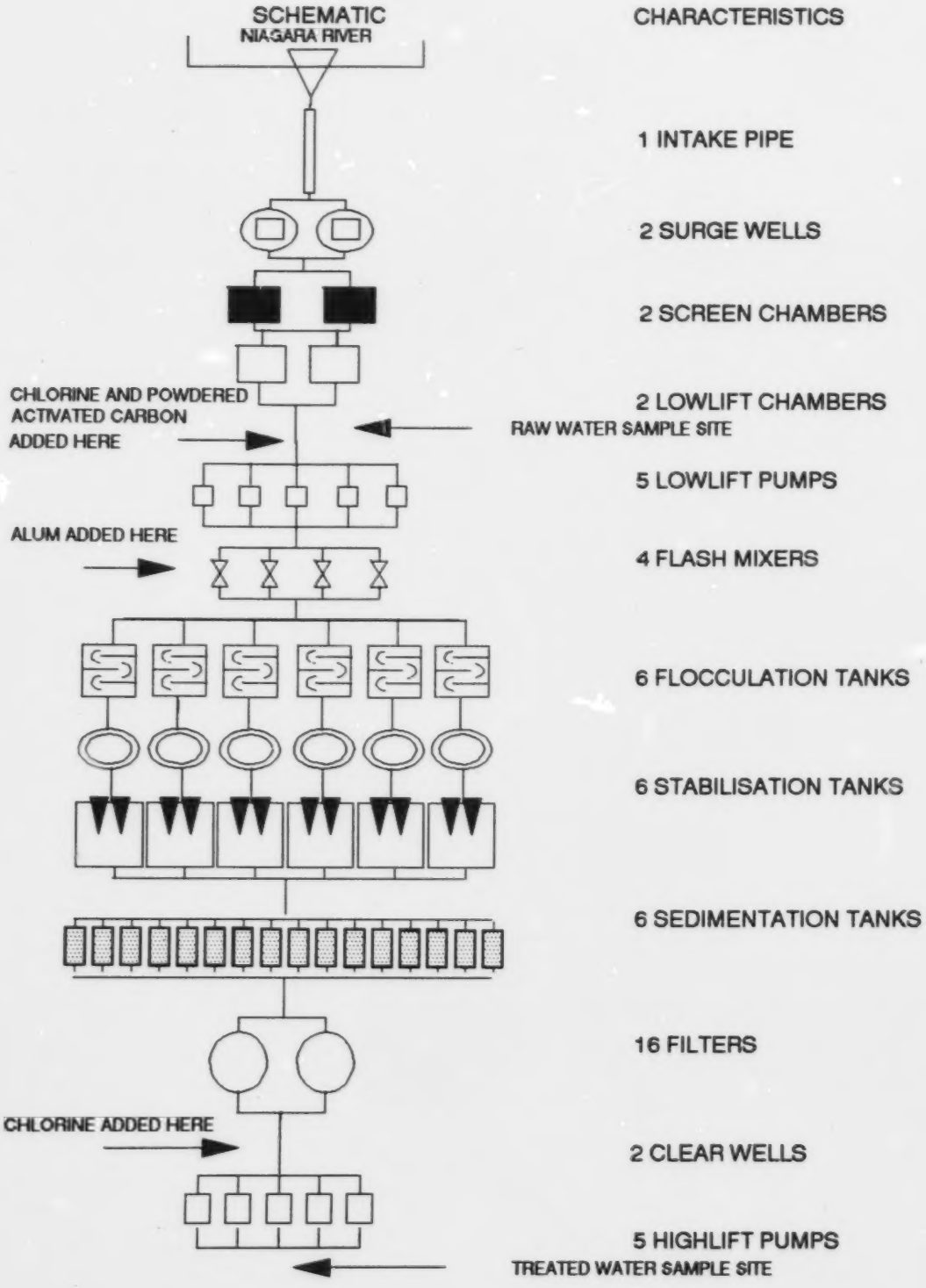

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 220002084
PLANT NAME: NIAGARA FALLS WTP

DISTRICT: WELLAND
REGION: WEST CENTRAL
DISTRICT OFFICER :J. MAYES

UTM #: 176574254790725

PLANT SUPERINTENDENT: MR HAROLD HODGSON

ADDRESS: 3599 MACKLEM ST.,
NIAGARA FALLS, ONTARIO.
L2G 6C7
(416-295-4831)

MUNICIPALITY: REG. MUNICIP.OF NIAGARA
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	21.884	(X 1000 M3)
DESIGN CAPACITY:	-	(X 1000 M3/DAY)
RATED CAPACITY:	145.475	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
NIAGARA	67,358
NIAGARA ON THE LAKE	296

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
COMBINED CHLORINE RESIDUAL	AFTER FILTERS	EVERY 4 HOURS
	AFTER SETTLING TANKS	EVERY 4 HOURS
	TREATED WATER	EVERY 4 HOURS
FREE CHLORINE RESIDUAL	AFTER FILTERS	EVERY 4 HOURS
	AFTER SETTLING TANKS	EVERY 4 HOURS
	TREATED WATER	EVERY 4 HOURS
TOTAL CHLORINE RESIDUAL	AFTER FILTERS	EVERY 4 HOURS
	AFTER SETTLING TANKS	EVERY 4 HOURS
	TREATED WATER	EVERY 4 HOURS
TASTE & ODOUR	AFTER FILTERS	2 READ/ WEEK
	RAW WATER	1 1/2W
	TREATED WATER	2 READ/ WEEK
TEMPERATURE	RAW WATER	DAILY
TURBIDITY	AFTER FILTERS	EVERY 4 HOURS
	RAW WATER	CONTINUOUS
	AFTER SETTLING TANKS	EVERY 4 HOURS
	TREATED WATER	EVERY 4 HOURS

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGE (MG/L)			
			TASTE & ODOUR	COAGULATION	PRE CHLORINATION	POST CHLORINATION
			ACTIVATED CARBON	ALUM LIQUID	CHLORINE	CHLORINE
DATE	DELAY * TIME(HRS)	FLOW (1000M3)	POWDER			
JAN 09	8.00	48.260		10.00	.70	.20
MAR 13	8.00	60.000			.70	.20
MAY 15	7.27	70.000		10.00	.80	.30
JUL 10	7.00	71.149	1.00	9.00	1.10	.30
SEP 11	18.00	57.517		11.00	1.30	.30
NOV 13	8.75	58.156		9.00	.90	.20

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2			SITE 3		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL															
FECAL COLIFORM MF	5	5	0	.	.	.	.	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	5	0	0	4	0	0	4	0	0	4	0	0
TOTAL COLIFORM MF	5	3	0	.	.	.	.	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF	5	5	0	.	.	.	.	.	.	.	.	.	.	.	.
*TOTAL SCAN BACTERIOLOGICAL	15	13	0	5	0	0	4	0	0	4	0	0	4	0	0
CHEMISTRY (FLD)															
FLD CHLORINE (COMB)	.	.	.	6	6	0	10	10	0	10	2	0	10	10	0
FLD CHLORINE FREE	.	.	.	6	6	0	10	9	0	10	0	0	10	7	0
FLD CHLORINE (TOTAL)	.	.	.	6	6	0	10	10	0	10	2	0	10	10	0
FLD PH	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
FLD TEMPERATURE	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
FLD TURBIDITY	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
*TOTAL SCAN CHEMISTRY (FLD)	18	18	0	36	36	0	60	59	0	60	34	0	60	57	0
CHEMISTRY (LAB)															
ALKALINITY	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
CALCIUM	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
CYANIDE	6	0	0	6	0	0	.	.	.	.	.	.	.	.	.
CHLORIDE	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
COLOUR	6	1	5	6	0	5	10	0	10	10	0	10	10	0	10
CONDUCTIVITY	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
DISS ORG CARBON	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
FLUORIDE	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
HARDNESS	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
IONCAL	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
LANGELIERS INDEX	6	6	0	5	5	0	8	8	0	10	10	0	9	9	0
MAGNESIUM	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
SODIUM	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
AMMONIUM TOTAL	6	0	2	6	0	0	10	4	0	10	5	1	10	3	2
NITRITE	6	5	1	6	1	3	10	2	7	10	1	6	10	2	6
TOTAL NITRATES	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
NITROGEN TOT KJELD	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
PH	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
PHOSPHORUS FIL REACT	6	2	2	6	0	1	.	.	.	.	.	.	.	.	.
PHOSPHORUS TOTAL	6	3	2	6	0	3	.	.	.	.	.	.	.	.	.
SULPHATE	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
TURBIDITY	6	6	0	6	3	3	10	8	2	10	7	3	10	7	3
*TOTAL SCAN CHEMISTRY (LAB)	132	107	12	131	93	15	188	162	19	190	163	20	189	161	21

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP
SUMMARY TABLE OF RESULTS (1990)

SITE	RAW			TREATED			SITE 1			SITE 2			SITE 3		
SCAN PARAMETER	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS															
SILVER	6	0	0	6	0	0	10	0	1	10	0	0	10	0	0
ALUMINUM	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
ARSENIC	6	1	5	6	0	5	10	0	8	10	0	10	10	0	8
BARIUM	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
BORON	6	4	2	6	5	1	10	10	0	10	10	0	10	10	0
BERYLLIUM	6	0	0	6	0	1	10	0	3	10	0	2	10	0	4
CADMIUM	6	0	0	6	0	1	10	0	5	10	0	4	10	0	2
COBALT	6	0	5	6	0	5	10	0	9	10	1	9	10	0	8
CHROMIUM	6	0	5	6	0	5	10	0	9	10	0	10	10	0	10
COPPER	6	0	6	6	0	6	10	5	5	10	8	2	10	4	6
IRON	6	2	4	6	0	0	10	0	2	10	0	10	10	0	1
MERCURY	6	2	1	6	1	1	.	.	.	.	.	.	.	.	.
MANGANESE	6	6	0	6	2	4	10	5	5	10	10	0	10	2	8
MOLYBDENUM	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
NICKEL	6	0	5	6	0	5	10	5	4	10	6	4	10	1	7
LEAD	6	1	4	6	0	2	10	7	3	10	5	5	10	2	5
ANTIMONY	6	0	6	6	3	3	10	4	6	10	6	4	10	8	2
SELENIUM	6	0	1	6	0	3	10	0	6	10	0	5	10	0	2
STRONTIUM	6	6	0	6	6	0	10	10	0	10	10	0	10	10	0
TITANIUM	6	2	4	6	0	6	10	2	8	10	1	9	10	2	8
THALLIUM	6	0	0	6	0	0	10	0	0	10	0	0	10	0	0
URANIUM	6	0	6	6	0	6	10	0	10	10	0	10	10	0	10
VANADIUM	6	1	5	6	4	2	10	8	2	10	3	7	10	9	1
ZINC	6	2	4	6	1	5	10	7	3	10	10	0	10	7	3
*TOTAL SCAN METALS	144	45	63	144	40	61	230	93	89	230	100	91	230	85	85
*TOTAL GROUP INORGANIC & PHYSICAL	294	170	75	311	169	76	478	314	108	480	297	111	479	303	106
CHLOROAROMATICS															
HEXACHLOROBUTADIENE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
123 TRICHLOROBENZENE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
1234 T-CHLOROBENZENE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
1235 T-CHLOROBENZENE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
124 TRICHLOROBENZENE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
1245 T-CHLOROBENZENE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
135 TRICHLOROBENZENE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
HCB	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
HEXACHLOROETHANE	6	0	0	6	0	1	5	0	0	5	0	1	5	0	1
OCTACHLOROSTYRENE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
PENTACHLOROBENZENE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
236 TRICHLOROTOLUENE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
245 TRICHLOROTOLUENE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
26A TRICHLOROTOLUENE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
*TOTAL SCAN CHLOROAROMATICS	84	0	0	84	0	1	70	0	0	70	0	1	70	0	1

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	SITE RAW TOTAL	RAW POSITIVE	RAW TRACE	TREATED TOTAL	TREATED POSITIVE	TREATED TRACE	SITE 1 TOTAL	SITE 1 POSITIVE	SITE 1 TRACE	SITE 2 TOTAL	SITE 2 POSITIVE	SITE 2 TRACE	SITE 3 TOTAL	SITE 3 POSITIVE	SITE 3 TRACE
CHLOROPHENOLS															
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0	0	0	0	0	0
PAH															
PHENANTHRENE	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
ANTHRACENE	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
FLUORANTHENE	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
PYRENE	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
BENZO(A)ANTHRACENE	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
CHRYSENE	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
DIMETH. BENZ(A)ANTHR	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
BENZO(E) PYRENE	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
BENZO(B) FLUORANTHEN	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
PERYLENE	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
BENZO(K) FLUORANTHEN	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
BENZO(A) PYRENE	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
BENZO(G,H,I) PERYLEN	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
DIBENZO(A,H) ANTHRAC	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
INDENO(1,2,3-C,D) PY	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
BENZO(B) CHRYSENE	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
CORONENE	6	0	0	6	0	0	1	0	0	1	0	0	.	.	.
*TOTAL SCAN PAH	102	0	0	102	0	0	17	0	0	17	0	0	0	0	0
PESTICIDES & PCB															
ALDRIN	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
ALPHA BHC	6	0	3	6	0	3	5	0	2	5	0	3	5	0	2
BETA BHC	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
LINDANE	6	0	0	6	0	1	5	0	0	5	0	0	5	0	0
ALPHA CHLORDANE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
GAMMA CHLORDANE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
DIELDRIN	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
METHOXYCHLOR	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
ENDOSULFAN 1	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
ENDOSULFAN II	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
ENDRIN	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
ENDOSULFAN SULPHATE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
HEPTACHLOR EPOXIDE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
HEPTACHLOR	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
MIREX	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
OXYCHLORDANE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
OPDDT	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
PCB	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
DDD	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
PPDDE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	SITE RAW TOTAL	RAW POSITIVE	RAW TRACE	TREATED TOTAL	TREATED POSITIVE	TREATED TRACE	SITE 1 TOTAL	SITE 1 POSITIVE	SITE 1 TRACE	SITE 2 TOTAL	SITE 2 POSITIVE	SITE 2 TRACE	SITE 3 TOTAL	SITE 3 POSITIVE	SITE 3 TRACE
PPDDT	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
AMETRINE	6	0	0	6	0	0	.	.	.	.	.	.	.	.	.
ATRAZINE	6	0	1	6	0	1	.	.	.	.	.	.	.	.	.
ATRATONE	6	0	0	6	0	0	.	.	.	.	.	.	.	.	.
CYANAZINE (BLADEX)	6	0	0	6	0	0	.	.	.	.	.	.	.	.	.
DESETHYLATRAZINE	6	0	0	6	0	0	.	.	.	.	.	.	.	.	.
D-ETHYL SIMAZINE	5	0	0	5	0	0	.	.	.	.	.	.	.	.	.
PROMETONE	6	0	0	6	0	0	.	.	.	.	.	.	.	.	.
PROPAZINE	6	0	0	6	0	0	.	.	.	.	.	.	.	.	.
PROMETRYNE	6	0	0	6	0	0	.	.	.	.	.	.	.	.	.
METRIBUZIN (SENCOR)	5	0	0	5	0	0	.	.	.	.	.	.	.	.	.
SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.	.	.	.
ALACHLOR (LASSO)	6	0	0	6	0	0	.	.	.	.	.	.	.	.	.
METOLACHLOR	6	0	0	6	0	0	.	.	.	.	.	.	.	.	.
HEXACLCYCLOPENTADIEN	1	0	0	1	0	0	.	.	.	1	0	0	1	0	0
*TOTAL SCAN PESTICIDES & PCB	203	0	4	203	0	5	105	0	2	106	0	3	106	0	2
PHENOLICS															
PHENOLICS	6	0	3	6	0	2	.	.	.	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	6	0	3	6	0	2	0	0	0	0	0	0	0	0	0
SPECIFIC PESTICIDES															
TOXAPHENE	6	0	0	6	0	0	5	0	0	5	0	0	5	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
DICAMBA	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
ETHION	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
PHORATE	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
BENOMYL	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
CICP	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
DIALLATE	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	SITE RAW TOTAL	RAW POSITIVE	RAW TRACE	TREATED TOTAL	TREATED POSITIVE	TREATED TRACE	SITE 1 TOTAL	SITE 1 POSITIVE	SITE 1 TRACE	SITE 2 TOTAL	SITE 2 POSITIVE	SITE 2 TRACE	SITE 3 TOTAL	SITE 3 POSITIVE	SITE 3 TRACE
EPTAM	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
IPC	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	58	0	0	58	0	0	5	0	0	5	0	0	5	0	0
VOLATILES															
BENZENE	6	0	0	6	0	0	5	0	2	3	0	1	4	0	0
TOLUENE	6	0	0	6	0	2	5	0	2	3	0	0	4	0	1
ETHYLBENZENE	6	0	0	6	0	3	5	0	1	3	0	1	4	0	4
P-XYLENE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
M-XYLENE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
O-XYLENE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
STYRENE	6	0	0	6	0	4	5	0	1	3	0	3	4	0	4
1,1 DICHLOROETHYLENE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
METHYLENE CHLORIDE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
T1,2DICHLOROETHYLENE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
1,1 DICHLOROETHANE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
CHLOROFORM	6	0	1	6	6	0	5	5	0	3	3	0	4	4	0
111, TRICHLOROETHANE	6	0	1	6	0	1	5	0	0	3	0	1	4	0	0
1,2 DICHLOROETHANE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
CARBON TETRACHLORIDE	6	0	0	6	0	1	5	0	1	3	0	0	4	0	1
1,2 DICHLOROPROPANE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
TRICHLOROETHYLENE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
DICHLOROBROMOMETHANE	6	0	2	6	6	0	5	5	0	3	3	0	4	4	0
112 TRICHLOROETHANE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
CHLORODIBROMOMETHANE	6	0	1	6	6	0	5	5	0	3	3	0	4	4	0
T-CHLOROETHYLENE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
BROMOFORM	6	0	0	6	0	6	5	0	5	3	0	3	4	0	4
1122 T-CHLOROETHANE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
CHLOROBENZENE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
1,4 DICHLOROBENZENE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
1,3 DICHLOROBENZENE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
1,2 DICHLOROBENZENE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
ETHLYENE DIBROMIDE	6	0	0	6	0	0	5	0	0	3	0	0	4	0	0
TOTL TRIHALOMETHANES	6	0	0	6	6	0	5	5	0	3	3	0	4	4	0
*TOTAL SCAN VOLATILES	174	0	5	174	24	17	145	20	12	87	12	9	116	16	14
*TOTAL GROUP ORGANIC	639	0	12	639	24	25	342	20	14	285	12	13	297	16	17

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
ICS	No Data: Contamination Suspected
IIL	No Data: Sample Incorrectly Labelled
IIS	No Data: Insufficient Sample
IIV	No Data: Inverted Septum
ILA	No Data: Laboratory Accident
ILD	No Data: Test Queued After Sample Discarded
INA	No Data: No Authorization To Perform Reanalysis
INP	No Data: No Procedure
INR	No Data: Sample Not Received
IOP	No Data: Obscured Plate
IQU	No Data: Quality Control Unacceptable
IPE	No Data: Procedural Error - Sample Discarded
IPH	No Data: Sample pH Outside Valid Range
IRE	No Data: Received Empty
IRO	No Data: See Attached Report (no numeric results)
ISM	No Data: Sample Missing
ISS	No Data: Send Separate Sample Properly Preserved
IUI	No Data: Indeterminant Interference
ITX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR		Unreliable: Could Not Confirm By Reanalysis
UCS		Unreliable: Contamination Suspected
UIN		Unreliable: Indeterminate Interference
XP		Positive After X Number Of Hours
T#	(T06)	Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

		WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2		SITE 3
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL								
FECAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = 0 (A1)			
MAR	100	.	.	.	.	.	.	.
MAY	120	.	.	.	.	.	.	.
JUL	76	.	.	.	.	.	.	.
SEP	4	.	.	.	.	.	.	.
NOV	4	.	.	.	.	.	.	.
STANDRD PLATE CNT MF (COUNT/ML)			DET'N LIMIT = 0		GUIDELINE = 500/ML (A3)			
MAR	.	0 <=>	.	1 <=>	.	1 <=>	.	4 <=>
MAY	.	0 <=>	.	0 <=>	.	2 <=>	.	0 <=>
JUL	.	0 <=>	.	0 <=>	.	1 <=>	.	.
SEP	.	0 <=>	.	0 <=>	.	.	.	7 <=>
NOV	.	1 <=>	.	.	.	0 <=>	.	0 <=>
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)			
MAR	1120	.	.	.	.	.	.	.
MAY	1200	.	.	.	.	.	.	.
JUL	700 <=>	.	.	.	.	.	.	.
SEP	160 <=>	.	.	.	.	.	.	.
NOV	280	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = N/A			
MAR	3700	.	.	.	.	.	.	.
MAY	22000	.	.	.	.	.	.	.
JUL	32000	.	.	.	.	.	.	.
SEP	16000	.	.	.	.	.	.	.
NOV	5400	.	.	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE TYPE	WATER TREATMENT PLANT RAW	WATER TREATMENT PLANT TREATED	DISTRIBUTION SYSTEM SITE 1 STANDING	DISTRIBUTION SYSTEM SITE 1 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	DISTRIBUTION SYSTEM SITE 2 FREE FLOW	DISTRIBUTION SYSTEM SITE 3 STANDING	DISTRIBUTION SYSTEM SITE 3 FREE FLOW
CHEMISTRY (FLD)								
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A				
JAN	.	.150	.150	.100	.000	.050	.200	.050
MAR	.	.140	.100	.100	.000	.000	.150	.050
MAY	.	.130	.200	.100	.000	.000	.100	.100
JUL	.	.120	.100	.100	.000	.000	.	.
SEP	.	.140	.200	.100	.	.	.100	.100
NOV	.	.150	.	.	.000	.050	.150	.050
FLD CHLORINE FREE (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A				
JAN	.	.450	.100	.200	.000	.000	.000	.300
MAR	.	.360	.050	.250	.000	.000	.050	.250
MAY	.	.330	.000	.200	.000	.000	.000	.150
JUL	.	.310	.100	.200	.000	.000	.	.
SEP	.	.370	.050	.200	.	.	.100	.250
NOV	.	.300	.	.	.000	.000	.000	.200
FLD CHLORINE (TOTAL) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A				
JAN	.	.600	.250	.300	.000	.050	.200	.350
MAR	.	.500	.150	.350	.000	.000	.200	.300
MAY	.	.460	.200	.300	.000	.000	.100	.250
JUL	.	.430	.200	.300	.000	.000	.	.
SEP	.	.510	.250	.300	.	.	.200	.350
NOV	.	.450	.	.	.000	.050	.150	.250
FLD PH (DIMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)				
JAN	7.500	7.500	7.500	7.500	7.500	7.500	7.400	7.200
MAR	7.900	7.500	7.600	7.400	7.500	7.500	7.500	6.800
MAY	8.000	7.400	7.600	7.600	7.500	7.500	7.500	7.500
JUL	8.000	7.500	7.500	7.400	7.500	7.500	.	.
SEP	7.800	7.000	7.600	7.400	.	.	7.500	7.600
NOV	8.000	7.500	.	.	7.500	7.500	7.500	7.500
FLD TEMPERATURE (DEG.C)		DET'N LIMIT = N/A		GUIDELINE = 15 (A3)				
JAN	.200	.500	16.000	6.000	12.000	4.000	11.500	2.500
MAR	.200	.400	15.000	4.000	9.500	4.000	13.000	2.000
MAY	8.300	7.000	17.000	9.000	13.000	10.500	16.000	8.500
JUL	21.300	22.000	18.000	19.500	18.000	15.000	.	.
SEP	21.900	22.100	21.000	21.000	.	.	20.000	21.000
NOV	10.100	9.000	.	.	16.000	11.000	16.000	11.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE TYPE	RAW	WATER TREATMENT PLANT TREATED	DISTRIBUTION SYSTEM SITE 1 STANDING	SITE 1 FREE FLOW	SITE 2 STANDING	SITE 2 FREE FLOW	SITE 3 STANDING	SITE 3 FREE FLOW
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)				
JAN	2.200	.310	.560	.520	.430	.370	.440	.330
MAR	2.600	.150	.220	.190	.560	.400	.250	.350
MAY	9.100	.300	.410	.240	.550	.450	.280	.290
JUL	1.800	.190	.210	.180	.510	.430	.	.
SEP	1.200	.190	.210	.170	.	.	.260	.310
NOV	20.200	.210	.	.	.400	.340	.200	.260

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE		WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
TYPE		RAW	TREATED	SITE 1		SITE 2		SITE 3	
				STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)									
ALKALINITY (MG/L)				DET'N LIMIT = 0.2		GUIDELINE = 30-500 (A3)			
JAN		101.700	93.100	93.700	94.100	93.300	93.700	94.300	94.000
MAR		96.200	89.800	90.800	90.400	92.100	90.300	91.400	90.800
MAY		95.000	88.900	90.200	88.900	88.500	88.800	89.400	89.900
JUL		94.800	88.000	88.500	87.500	87.800	88.000	.	.
SEP		95.100	88.300	88.700	89.100	.	.	89.700	89.700
NOV		97.900	92.100	.	.	92.200	92.300	93.100	93.000
CALCIUM (MG/L)				DET'N LIMIT = 0.2		GUIDELINE = 100 (F2)			
JAN		40.400	39.900	41.400	40.300	40.800	40.800	39.800	41.000
MAR		36.600	37.800	37.600	37.200	37.200	37.200	37.200	36.800
MAY		34.800	35.100	34.900	34.400	35.100	35.000	34.900	34.900
JUL		36.200	36.200	35.800	36.400	35.200	36.400	.	.
SEP		34.700	34.800	35.100	35.400	.	.	35.800	36.800
NOV		37.600	37.800	.	.	38.200	38.800	38.000	39.200
CHLORIDE (MG/L)				DET'N LIMIT = 0.2		GUIDELINE = 250 (A3)			
JAN		14.500	15.000	15.300	15.100	15.800	15.200	15.100	15.000
MAR		15.900	16.600	16.900	16.600	16.800	16.800	16.800	16.600
MAY		15.600	16.300	16.700	16.400	16.500	16.500	16.500	16.300
JUL		14.900	16.600	16.800	16.500	16.500	16.500	.	.
SEP		15.200	16.500	16.100	16.000	.	.	16.300	16.100
NOV		14.500	15.400	.	.	15.600	15.400	15.300	15.500
COLOUR (HZU)				DET'N LIMIT = 0.5		GUIDELINE = 5 (A3)			
JAN		5.500	BDL	.500 <T	.500 <T	1.500 <T	1.000 <T	.500 <T	1.000 <T
MAR		2.000 <T	1.000 <T	1.000 <T	1.000 <T	2.000 <T	2.000 <T	1.000 <T	1.500 <T
MAY		1.500 <T	1.000 <T	1.500 <T	1.000 <T	1.500 <T	1.500 <T	1.000 <T	1.000 <T
JUL		1.500 <T	.500 <T	.500 <T	.500 <T	1.500 <T	1.000 <T	.	.
SEP		1.500 <T	.500 <T	.500 <T	.500 <T	.	.	.500 <T	.500 <T
NOV		1.500 <T	1.000 <T	.	.	1.000 <T	1.500 <T	.500 <T	.500 <T
CONDUCTIVITY (UMHO/CM)				DET'N LIMIT = 1.		GUIDELINE = 400 (F2)			
JAN		291	295	301	295	303	295	298	297
MAR		286	289	298	290	293	290	292	291
MAY		284	287	292	288	291	288	291	289
JUL		285	289	293	291	296	291	.	.
SEP		282	285	285	286	.	.	287	287
NOV		291	293	.	.	296	292	295	295

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE TYPE	WATER TREATMENT PLANT RAW	WATER TREATMENT PLANT TREATED	DISTRIBUTION SYSTEM SITE 1 STANDING	DISTRIBUTION SYSTEM SITE 1 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	DISTRIBUTION SYSTEM SITE 2 FREE FLOW	DISTRIBUTION SYSTEM SITE 3 STANDING	DISTRIBUTION SYSTEM SITE 3 FREE FLOW
DISS ORG CARBON (MG/L)		DET'N LIMIT = .100		GUIDELINE = 5.0 (A3)				
JAN	2.000	1.600	1.800	1.700	1.800	1.600	1.800	1.700
MAR	2.000	1.600	2.000	1.700	1.900	1.900	1.700	1.800
MAY	2.300	2.000	2.200	2.000	2.000	1.800	2.000	1.900
JUL	2.300	2.100	2.300	1.900	2.000	1.800	.	.
SEP	1.800	1.600	1.700	1.500	.	.	2.000	1.600
NOV	2.000	1.700	.	.	1.700	1.700	1.700	1.900
FLUORIDE (MG/L)		DET'N LIMIT = 0.01		GUIDELINE = 2.4 (A1)				
JAN	.120	.100	.120	.100	.100	.100	.100	.100
MAR	.120	.100	.100	.100	.080	.100	.100	.100
MAY	.120	.120	.100	.120	.100	.100	.120	.120
JUL	.120	.120	.120	.120	.120	.100	.	.
SEP	.100	.120	.100	.100	.	.	.100	.100
NOV	.140	.160	.	.	.120	.120	.100	.160
HARDNESS (MG/L)		DET'N LIMIT = 0.5		GUIDELINE = 80-100 (A4)				
JAN	136.800	136.200	139.800	137.100	139.200	138.100	135.900	138.800
MAR	127.000	129.000	129.000	129.000	128.000	128.000	128.000	127.000
MAY	122.100	122.900	121.700	120.800	122.600	122.400	121.700	121.700
JUL	126.000	125.000	125.000	126.000	124.000	127.000	.	.
SEP	122.500	122.800	122.700	124.000	.	.	125.100	127.600
NOV	130.000	131.000	.	.	131.000	132.000	131.000	134.000
IONCAL (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = N/A				
JAN	5.076	5.089	6.588	5.814	6.485	6.666	4.160	6.657
MAR	1.763	3.605	2.153	1.667	.089	1.575	1.604	.733
MAY	1.581	1.137	3.793	2.499	2.351	1.793	2.446	2.582
JUL	2.026	.128	1.148	.012	2.229	1.391	.	.
SEP	1.187	.352	.737	.423	.	.	.968	2.442
NOV	2.841	3.196	.	.	3.151	4.224	2.258	4.629
LANGELIERS INDEX (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = N/A				
JAN	.288	-.067	-.001	-.028	.060	.045	.036	-.002
MAR	.373	.256	.225	.262	.298	.261	.286	.308
MAY	.366	.090	.102	.111	.207	.138	.179	.162
JUL	.422	.288	.215	.288	.223	.280	.	.
SEP	.446	.214	.220	.205	.	.	.243	.255
NOV	.330	.185	.	.	.279	.248	.242	.265

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE TYPE	RAW	TREATED	WATER TREATMENT PLANT / DISTRIBUTION SYSTEM SITE 1 STANDING	SITE 1 FREE FLOW	SITE 2 STANDING	SITE 2 FREE FLOW	SITE 3 STANDING	SITE 3 FREE FLOW
MAGNESIUM (MG/L)			DET'N LIMIT = 0.10	GUIDELINE = 30 (F2)				
JAN	8.700	8.900	8.850	8.850	9.050	8.850	8.900	8.850
MAR	8.500	8.500	8.600	8.600	8.600	8.500	8.500	8.600
MAY	8.550	8.550	8.350	8.500	8.500	8.500	8.400	8.400
JUL	8.700	8.400	8.700	8.500	8.800	8.800	.	.
SEP	8.700	8.700	8.500	8.650	.	.	8.700	8.650
NOV	8.800	8.800	.	.	8.800	8.600	8.700	8.700
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)				
JAN	8.700	8.300	8.600	8.400	8.600	8.500	8.500	8.600
MAR	9.200	9.000	9.200	8.800	9.000	8.800	9.000	8.800
MAY	8.500	8.400	8.700	8.600	8.400	8.500	8.600	8.600
JUL	8.400	8.400	8.600	8.400	8.400	8.800	.	.
SEP	8.100	8.200	8.200	8.300	.	.	8.400	8.300
NOV	8.600	8.600	.	.	8.200	8.400	8.200	8.200
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)				
JAN	BDL	BDL	.220	BDL	.358	BDL	.002 <T	.004 <T
MAR	BDL	BDL	.368	BDL	.182	BDL	BDL	BDL
MAY	BDL	BDL	.076	BDL	.200	BDL	.010	BDL
JUL	BDL	BDL	.034	BDL	.178	BDL	.	.
SEP	.002 <T	BDL	BDL	BDL	.	.	.046	BDL
NOV	.006 <T	BDL	.	.	.236	.004 <T	.022	BDL
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)				
JAN	.001 <T	BDL	.001 <T	BDL	.001 <T	BDL	BDL	.001 <T
MAR	.009	.006	.014	.012	.005	.003 <T	.016	.013
MAY	.007	.001 <T	.003 <T	.002 <T	.003 <T	.003 <T	.003 <T	.002 <T
JUL	.005	.004 <T	.003 <T	.002 <T	.003 <T	.001 <T	.	.
SEP	.006	.002 <T	.001 <T	.003 <T	.	.	.002 <T	.001 <T
NOV	.007	BDL	.	.	BDL	BDL	.001 <T	BDL
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)				
JAN	.195	.200	.805	.195	.690	.200	.200	.205
MAR	.240	.240	.850	.245	.565	.225	.255	.235
MAY	.355	.350	.525	.365	.770	.360	.360	.355
JUL	.280	.265	.365	.265	.870	.265	.	.
SEP	.155	.145	.170	.140	.	.	.160	.135
NOV	.250	.230	.	.	.520	.240	.245	.230

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = 0.02		GUIDELINE = N/A			
JAN	.170	.120	.440	.120	.550	.120	.180	.120
MAR	.220	.160	.730	.150	.330	.150	.210	.150
MAY	.240	.120	.410	.130	.390	.120	.190	.120
JUL	.230	.170	.290	.150	.380	.160	.	.
SEP	.180	.140	.190	.160	.	.	.350	.150
NOV	.275	.160	.	.	.410	.150	.190	.140
PH (DIMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)			
JAN	8.110	7.800	7.850	7.830	7.920	7.900	7.900	7.850
MAR	8.260	8.160	8.130	8.170	8.200	8.170	8.190	8.220
MAY	8.280	8.030	8.040	8.060	8.150	8.080	8.120	8.100
JUL	8.320	8.220	8.150	8.220	8.170	8.210	.	.
SEP	8.360	8.160	8.160	8.140	.	.	8.170	8.170
NOV	8.200	8.080	.	.	8.170	8.130	8.130	8.140
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = 0.0005		GUIDELINE = N/A			
JAN	.001 <T	BDL	.	.	.	.	.	.
MAR	.000 <T	BDL	.	.	.	.	.	.
MAY	.003	BDL	.	.	.	.	.	.
JUL	BDL	BDL	.	.	.	.	.	.
SEP	BDL	BDL	.	.	.	.	.	.
NOV	.014	.002 <T	.	.	.	.	.	.
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002		GUIDELINE = .40 (F2)			
JAN	.011	.004 <T	.	.	.	.	.	.
MAR	.009 <T	BDL	.	.	.	.	.	.
MAY	.023	.002 <T	.	.	.	.	.	.
JUL	.009 <T	BDL	.	.	.	.	.	.
SEP	BDL	BDL	.	.	.	.	.	.
NOV	.040	.003 <T	.	.	.	.	.	.
SULPHATE (MG/L)			DET'N LIMIT = .200		GUIDELINE = 500 (A3)			
JAN	24.190	30.580	30.020	29.450	30.090	29.870	30.720	30.510
MAR	23.320	28.450	28.520	29.050	29.280	28.680	27.890	29.030
MAY	23.470	28.350	29.160	28.510	29.150	28.790	28.690	28.650
JUL	23.710	29.750	30.840	31.080	30.690	30.680	.	.
SEP	23.570	27.730	28.250	28.060	.	.	27.780	27.960
NOV	24.400	28.800	.	.	28.390	28.350	28.530	27.920

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE TYPE	WATER TREATMENT PLANT RAW	WATER TREATMENT PLANT TREATED	DISTRIBUTION SYSTEM SITE 1 STANDING	DISTRIBUTION SYSTEM SITE 1 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	DISTRIBUTION SYSTEM SITE 2 FREE FLOW	DISTRIBUTION SYSTEM SITE 3 STANDING	DISTRIBUTION SYSTEM SITE 3 FREE FLOW
TURBIDITY (FTU)		DET'N LIMIT = 0.05		GUIDELINE = 1 (A1)				
JAN	1.800	.210	.710	.410	.490	.240	.140	.180
MAR	4.000	.220	1.130	.460	1.390	.970	.250	.750
MAY	14.900	.290	.440	.130	.220	.160	.170	.140
JUL	1.700	.180 <T	.250 <T	.100 <T	.240 <T	.240 <T	.	.
SEP	1.070	.190 <T	.460	.320	.	.	.420	.240 <T
NOV	26.000	.160 <T	.	.	.320	.200 <T	.230 <T	.130 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE		WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
TYPE		RAW	TREATED	SITE 1		SITE 2		SITE 3	
				STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
METALS									
SILVER (UG/L)				DET'N LIMIT = 0.05		GUIDELINE = 50 (A1)			
JAN		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MAR		BDL	BDL	.060 <T	BDL	BDL	BDL	BDL	BDL
MAY		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
JUL		BDL	BDL	BDL	BDL	BDL	BDL	.	.
SEP		BDL	BDL	BDL	BDL	.	.	BDL	BDL
NOV		BDL	BDL	.	.	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)				DET'N LIMIT = 0.10		GUIDELINE = 100 (A4)			
JAN		56.000	52.000	41.000	36.000	28.000	26.000	36.000	33.000
MAR		53.000	57.000	49.000	51.000	48.000	41.000	63.000	56.000
MAY		110.000	81.000	83.000	74.000	51.000	52.000	71.000	75.000
JUL		18.000	140.000	110.000	140.000	110.000	110.000	.	.
SEP		8.900	200.000	170.000	180.000	.	.	180.000	180.000
NOV		230.000	76.000	.	.	57.000	55.000	74.000	72.000
ARSENIC (UG/L)				DET'N LIMIT = 0.10		GUIDELINE = 25 (A1)			
JAN		.710 <T	.280 <T	.230 <T	.260 <T	.160 <T	.150 <T	.330 <T	.200 <T
MAR		.580 <T	.380 <T	.280 <T	.360 <T	.360 <T	.380 <T	.450 <T	.340 <T
MAY		.510 <T	.180 <T	.390 <T	.140 <T	.280 <T	.210 <T	.220 <T	.270 <T
JUL		.680 <T	.270 <T	.430 <T	.490 <T	.510 <T	.230 <T	.	.
SEP		.400 <T	BDL	BDL	BDL	.	.	BDL	BDL
NOV		1.100	.460 <T	.	.	.380 <T	.480 <T	.430 <T	.470 <T
BARIUM (UG/L)				DET'N LIMIT = 0.05		GUIDELINE = 1000 (A2)			
JAN		20.000	21.000	21.000	20.000	19.000	19.000	20.000	20.000
MAR		20.000	20.000	20.000	20.000	19.000	20.000	20.000	20.000
MAY		21.000	20.000	20.000	20.000	19.000	20.000	19.000	19.000
JUL		18.000	17.000	18.000	22.000	21.000	21.000	.	.
SEP		19.000	19.000	19.000	20.000	.	.	19.000	19.000
NOV		23.000	20.000	.	.	20.000	20.000	20.000	20.000
BORON (UG/L)				DET'N LIMIT = 2.00		GUIDELINE = 5000 (A1)			
JAN		28.000	22.000	32.000	32.000	32.000	31.000	32.000	30.000
MAR		35.000	30.000	35.000	37.000	37.000	36.000	38.000	37.000
MAY		43.000	100.000	100.000	100.000	100.000	100.000	92.000	92.000
JUL		20.000 <T	20.000 <T	22.000	31.000	31.000	29.000	.	.
SEP		32.000	21.000	31.000	29.000	.	.	33.000	31.000
NOV		20.000 <T	21.000	.	.	23.000	22.000	23.000	22.000

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 6800 (D4)			
JAN	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MAR	BDL	BDL	.080 <T	BDL	BDL	BDL	BDL	.070 <T
MAY	BDL	.150 <T	.090 <T	.110 <T	.090 <T	.140 <T	.110 <T	.090 <T
JUL	BDL	BDL	BDL	BDL	BDL	BDL	.	.
SEP	BDL	BDL	BDL	BDL	.	.	.060 <T	BDL
NOV	BDL	BDL	.	.	BDL	BDL	BDL	BDL
CADMIUM (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)			
JAN	BDL	BDL	.200 <T	BDL	.090 <T	BDL	BDL	BDL
MAR	BDL	BDL	.130 <T	BDL	.120 <T	BDL	BDL	BDL
MAY	BDL	BDL	.130 <T	BDL	BDL	BDL	.080 <T	BDL
JUL	BDL	BDL	.170 <T	BDL	.090 <T	BDL	.	.
SEP	BDL	.080 <T	.250 <T	BDL	.	.	.080 <T	BDL
NOV	BDL	BDL	.	.	.090 <T	BDL	BDL	BDL
COBALT (UG/L)			DET'N LIMIT = 0.02		GUIDELINE = N/A			
JAN	.120 <T	.240 <T	.320 <T	.100 <T	.400 <T	.110 <T	.180 <T	.110 <T
MAR	.120 <T	.090 <T	.380 <T	.060 <T	.470 <T	.090 <T	.090 <T	.110 <T
MAY	.160 <T	.080 <T	.250 <T	.090 <T	.510 <T	.120 <T	.110 <T	.140 <T
JUL	.120 <T	.140 <T	.220 <T	.120 <T	1.200	.060 <T	.	.
SEP	BDL	BDL	.030 <T	BDL	.	.	BDL	BDL
NOV	.430 <T	.120 <T	.	.	.170 <T	.130 <T	.110 <T	.120 <T
CHROMIUM (UG/L)			DET'N LIMIT = 0.50		GUIDELINE = 50 (A1)			
JAN	2.800 <T	.750 <T	3.700 <T	3.500 <T	3.800 <T	3.300 <T	3.400 <T	3.200 <T
MAR	2.000 <T	1.800 <T	2.600 <T	2.700 <T	2.800 <T	2.500 <T	2.700 <T	2.700 <T
MAY	1.100 <T	3.800 <T	4.000 <T	3.600 <T	3.800 <T	3.800 <T	3.100 <T	3.200 <T
JUL	BDL	BDL	BDL	2.700 <T	3.000 <T	2.300 <T	.	.
SEP	2.300 <T	.790 <T	2.400 <T	2.200 <T	.	.	2.200 <T	2.200 <T
NOV	.960 <T	1.200 <T	.	.	1.300 <T	1.100 <T	1.200 <T	1.100 <T
COPPER (UG/L)			DET'N LIMIT = 0.50		GUIDELINE = 1000 (A3)			
JAN	1.100 <T	.940 <T	64.000	3.000 <T	37.000	19.000	13.000	1.700 <T
MAR	1.000 <T	1.200 <T	46.000	2.500 <T	35.000	4.700 <T	14.000	2.000 <T
MAY	1.300 <T	.920 <T	48.000	2.800 <T	26.000	5.900	12.000	1.500 <T
JUL	1.100 <T	.850 <T	12.000	1.400 <T	26.000	8.700	.	.
SEP	1.100 <T	.770 <T	12.000	1.800 <T	.	.	3.700 <T	1.200 <T
NOV	1.700 <T	.960 <T	.	.	24.000	3.500 <T	8.200	1.200 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
			SITE 1		SITE 2		SITE 3	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
IRON (UG/L)			DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)			
JAN	43.000 <T	BDL	BDL	BDL	45.000 <T	51.000 <T	BDL	BDL
MAR	40.000 <T	BDL	BDL	BDL	52.000 <T	30.000 <T	7.100 <T	BDL
MAY	160.000	BDL	13.000 <T	BDL	29.000 <T	28.000 <T	BDL	BDL
JUL	25.000 <T	BDL	8.300 <T	BDL	27.000 <T	25.000 <T	.	.
SEP	17.000 <T	BDL	BDL	BDL	.	.	BDL	BDL
NOV	400.000	BDL	.	.	42.000 <T	50.000 <T	BDL	BDL
MERCURY (UG/L)			DET'N LIMIT = 0.02		GUIDELINE = 1 (A1)			
JAN	.060	.060	.	.	.	.	.	.
MAR	BDL	BDL	.	.	.	.	.	.
MAY	BDL	BDL	.	.	.	.	.	.
JUL	.300	.040 <T	.	.	.	.	.	.
SEP	BDL	BDL	.	.	.	.	.	.
NOV	.100 <T	BDL	.	.	.	.	.	.
MANGANESE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 50 (A3)			
JAN	2.300	1.600	.640	.410 <T	2.400	2.000	.330 <T	.270 <T
MAR	2.000	.310 <T	.660	.390 <T	2.600	2.000	.310 <T	.300 <T
MAY	8.300	.840	1.400	.870	3.100	2.700	.790	.620
JUL	2.500	.430 <T	.680	.480 <T	3.200	2.000	.	.
SEP	2.100	.210 <T	.310 <T	.240 <T	.	.	.180 <T	.110 <T
NOV	24.000	.390 <T	.	.	2.900	2.900	.300 <T	.360 <T
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = N/A			
JAN	1.200	1.300	1.300	1.200	1.200	1.100	1.200	1.200
MAR	.950	1.100	1.100	1.300	1.100	1.200	1.300	1.100
MAY	.880	1.100	1.000	1.000	1.100	1.000	1.100	1.000
JUL	1.200	1.200	1.200	1.300	1.200	1.300	.	.
SEP	1.100	1.200	1.100	1.100	.	.	1.200	1.100
NOV	.640	1.200	.	.	1.200	1.100	1.100	1.200
NICKEL (UG/L)			DET'N LIMIT = 0.20		GUIDELINE = 350 (D3)			
JAN	.610 <T	.490 <T	210.000	.930 <T	60.000	.900 <T	1.400 <T	BDL
MAR	.880 <T	.630 <T	70.000	1.200 <T	220.000	1.200 <T	.810 <T	1.100 <T
MAY	1.100 <T	.820 <T	110.000	.960 <T	220.000	1.100 <T	3.300	.670 <T
JUL	1.100 <T	.900 <T	41.000	1.000 <T	640.000	2.400	.	.
SEP	BDL	BDL	12.000	BDL	.	.	.820 <T	BDL
NOV	1.200 <T	.610 <T	.	.	2.600	.510 <T	2.000 <T	.600 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
LEAD (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 10. (A1)			
JAN	.120 <T	BDL	25.000	.390 <T	.700	.470 <T	.430 <T	BDL
MAR	.110 <T	.070 <T	24.000	.630	1.100	.190 <T	.580	.060 <T
MAY	.440 <T	BDL	13.000	.470 <T	.700	.170 <T	.590	BDL
JUL	.100 <T	BDL	9.400	.400 <T	.800	.270 <T	.	.
SEP	BDL	BDL	10.000	.600	.	.	.280 <T	BDL
NOV	1.100	.060 <T	.	.	.650	.140 <T	.440 <T	.060 <T
ANTIMONY (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 146 (D4)			
JAN	.440 <T	.600	.420 <T	.430 <T	.560	.380 <T	.560	.470 <T
MAR	.440 <T	.410 <T	.570	.500 <T	.460 <T	.580	.600	.480 <T
MAY	.400 <T	.530	.690	.600	.610	.690	.640	.640
JUL	.480 <T	.430 <T	.440 <T	.520	.450 <T	.440 <T	.	.
SEP	.280 <T	.370 <T	.420 <T	.500 <T	.	.	.580	.510
NOV	.310 <T	.520	.	.	.520	.530	.530	.550
SELENIUM (UG/L)			DET'N LIMIT = 1.00		GUIDELINE = 10 (A1)			
JAN	BDL	BDL	1.200 <T	BDL	BDL	BDL	BDL	BDL
MAR	BDL	1.100 <T	BDL	1.300 <T	1.100 <T	1.400 <T	BDL	BDL
MAY	1.600 <T	1.900 <T	2.900 <T	1.500 <T	1.200 <T	2.100 <T	1.500 <T	BDL
JUL	BDL	BDL	BDL	1.200 <T	1.400 <T	BDL	.	.
SEP	BDL	1.300 <T	1.400 <T	BDL	.	.	BDL	1.100 <T
NOV	BDL	BDL	.	.	BDL	BDL	BDL	BDL
STRONTIUM (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = N/A			
JAN	160.000	160.000	160.000	160.000	150.000	150.000	160.000	160.000
MAR	160.000	160.000	160.000	160.000	160.000	160.000	160.000	160.000
MAY	160.000	160.000	170.000	170.000	170.000	160.000	170.000	170.000
JUL	150.000	140.000	150.000	160.000	160.000	160.000	.	.
SEP	170.000	170.000	170.000	170.000	.	.	170.000	170.000
NOV	160.000	150.000	.	.	150.000	150.000	160.000	160.000
TITANIUM (UG/L)			DET'N LIMIT = 0.50		GUIDELINE = N/A			
JAN	3.800 <T	2.400 <T	3.500 <T	2.900 <T	2.300 <T	2.000 <T	3.700 <T	3.300 <T
MAR	4.500 <T	2.700 <T	2.800 <T	2.600 <T	2.800 <T	2.600 <T	2.900 <T	2.600 <T
MAY	6.000	5.000 <T	5.300	5.300	4.900 <T	5.400	5.300	5.800
JUL	4.600 <T	4.200 <T	4.600 <T	4.500 <T	4.700 <T	4.300 <T	.	.
SEP	2.700 <T	2.400 <T	2.400 <T	2.600 <T	.	.	2.800 <T	2.300 <T
NOV	8.200	2.100 <T	.	.	2.300 <T	1.900 <T	2.100 <T	2.100 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE		WATER TREATMENT PLANT			DISTRIBUTION SYSTEM			
			SITE 1		SITE 2		SITE 3	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
URANIUM (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 100 (A1)			
JAN	.240 <T	.240 <T	.190 <T	.240 <T	.140 <T	.120 <T	.200 <T	.190 <T
MAR	.320 <T	.260 <T	.260 <T	.270 <T	.220 <T	.210 <T	.240 <T	.260 <T
MAY	.360 <T	.300 <T	.200 <T	.250 <T	.220 <T	.240 <T	.240 <T	.240 <T
JUL	.260 <T	.170 <T	.180 <T	.160 <T	.160 <T	.170 <T	.	.
SEP	.270 <T	.180 <T	.200 <T	.180 <T	.	.	.210 <T	.210 <T
NOV	.330 <T	.280 <T	.	.	.230 <T	.240 <T	.260 <T	.240 <T
VANADIUM (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = N/A			
JAN	.330 <T	.890	.680	.780	.490 <T	.450 <T	.810	.780
MAR	.230 <T	.600	.600	.650	.510	.420 <T	.630	.590
MAY	.280 <T	.490 <T	.620	.530	.380 <T	.360 <T	.590	.580
JUL	.240 <T	.640	.570	.620	.530	.510	.	.
SEP	.140 <T	.500 <T	.480 <T	.500 <T	.	.	.490 <T	.510
NOV	.730	.540	.	.	.370 <T	.380 <T	.550	.510
ZINC (UG/L)			DET'N LIMIT = 0.20		GUIDELINE = 5000 (A3)			
JAN	1.000 <T	.880 <T	79.000	2.000 <T	60.000	5.900	24.000	1.800 <T
MAR	1.700 <T	1.600 <T	77.000	3.400	71.000	3.000	41.000	2.700
MAY	2.500	1.100 <T	69.000	4.500	75.000	4.000	27.000	1.700 <T
JUL	1.900 <T	1.500 <T	29.000	1.900 <T	160.000	4.800	.	.
SEP	.950 <T	1.100 <T	22.000	1.700 <T	.	.	8.000	1.700 <T
NOV	6.000	2.400	.	.	12.000	3.300	25.000	2.300

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS								
HEXACHLOROETHANE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 1900 (D4)			
JAN	BDL	BDL	.	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL
NOV	BDL	3.000 <T	.	.	.	2.000 <T	.	2.000 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB								
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 700 (G)			
JAN	2.000 <T	2.000 <T	.	2.000 <T	.	2.000 <T	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL	.	BDL
MAY	1.000 <T	2.000 <T	.	2.000 <T	.	1.000 <T	.	2.000 <T
JUL	BDL	BDL	.	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL
NOV	1.000 <T	1.000 <T	.	.	.	1.000 <T	.	1.000 <T
LINDANE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 4000 (A1)			
JAN	BDL	BDL	.	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL	.	BDL
MAY	BDL	1.000 <T	.	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL
NOV	BDL	BDL	.	.	.	BDL	.	BDL
ATRAZINE (NG/L)			DET'N LIMIT = 50		GUIDELINE = 60000 (A2)			
JAN	BDL	BDL	.	.	.	.	.	.
MAR	BDL	BDL	.	.	.	.	.	.
MAY	BDL	BDL	.	.	.	.	.	.
JUL	BDL	BDL	.	.	.	.	.	.
SEP	BDL	BDL	.	.	.	.	.	.
NOV	180.000 <T	150.000 <T	.	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM					
SITE TYPE	RAW	TREATED	SITE 1		SITE 2		SITE 3	
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L)	PHENOLICS		DET'N LIMIT = .200		GUIDELINE = 2 (A4)			
JAN	.400 <T	BDL	.	.	.	.	.	.
MAR	.800 <T	.600 <T	.	.	.	.	.	.
MAY	BDL	BDL	.	.	.	.	.	.
JUL	BDL	BDL	.	.	.	.	.	.
SEP	BDL	BDL	.	.	.	.	.	.
NOV	.600 <T	.600 <T	.	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE TYPE	WATER TREATMENT PLANT RAW	WATER TREATMENT PLANT TREATED	DISTRIBUTION SYSTEM SITE 1 STANDING	DISTRIBUTION SYSTEM SITE 1 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	DISTRIBUTION SYSTEM SITE 2 FREE FLOW	DISTRIBUTION SYSTEM SITE 3 STANDING	DISTRIBUTION SYSTEM SITE 3 FREE FLOW
VOLATILES								
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)				
JAN	BDL	BDL	.	BDL	.	.	.	BDL
MAR	BDL	BDL	.	.100 <T	.	.100 <T	.	IU
MAY	BDL	BDL	.	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	.050 <T	.	IU	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL
NOV	BDL	BDL	.	.	.	BDL	.	BDL
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)				
JAN	BDL	.100 <T	.	.100 <T	.	.	.	.100 <T
MAR	BDL	BDL	.	BDL	.	BDL	.	IU
MAY	BDL	BDL	.	BDL	.	BDL	.	BDL
JUL	BDL	.050 <T	.	.100 <T	.	IU	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL
NOV	BDL	BDL	.	.	.	BDL	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)				
JAN	BDL	BDL	.	BDL	.	.	.	.050 <T
MAR	BDL	.150 <T	.	.200 <T	.	.150 <T	.	IU
MAY	BDL	.200 <T	.	BDL	.	BDL	.	.050 <T
JUL	BDL	BDL	.	BDL	.	IU	.	.
SEP	BDL	BDL	.	BDL	.	.	.	.100 <T
NOV	BDL	.050 <T	.	.	.	BDL	.	.100 <T
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)				
JAN	BDL	.100 <T	.	BDL	.	.	.	.200 <T
MAR	BDL	.200 <T	.	.200 <T	.	.200 <T	.	IU
MAY	BDL	.250 <T	.	BDL	.	.050 <T	.	.150 <T
JUL	BDL	BDL	.	BDL	.	IU	.	.
SEP	BDL	BDL	.	BDL	.	.	.	.150 <T
NOV	BDL	.050 <T	.	.	.	.050 <T	.	.150 <T
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)				
JAN	.100 <T	14.400	.	14.600	.	.	.	14.100
MAR	BDL	10.800	.	14.200	.	10.000	.	IU
MAY	BDL	13.800	.	15.000	.	11.900	.	13.900
JUL	BDL	10.900	.	14.700	.	IU	.	.
SEP	BDL	19.100	.	17.500	.	.	.	17.900
NOV	BDL	11.300	.	.	.	8.700	.	11.400

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE TYPE	WATER TREATMENT PLANT RAW	WATER TREATMENT PLANT TREATED	DISTRIBUTION SYSTEM SITE 1 STANDING	DISTRIBUTION SYSTEM SITE 1 FREE FLOW	DISTRIBUTION SYSTEM SITE 2 STANDING	DISTRIBUTION SYSTEM SITE 2 FREE FLOW	DISTRIBUTION SYSTEM SITE 3 STANDING	DISTRIBUTION SYSTEM SITE 3 FREE FLOW
111, TRICHLOROETHANE (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 200 (D1)				
JAN	BDL	BDL	.	BDL	.	.	.	BDL
MAR	.020 <T	.020 <T	.	BDL	.	.020 <T	.	IU
MAY	BDL	BDL	.	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	IU	.	.
SEP	BDL	BDL	.	BDL	.	.	.	BDL
NOV	BDL	BDL	.	.	.	BDL	.	BDL
CARBON TETRACHLORIDE (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 5 (A1)				
JAN	BDL	BDL	.	BDL	.	.	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL	.	IU
MAY	BDL	BDL	.	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	IU	.	.
SEP	BDL	.400 <T	.	.400 <T	.	.	.	.400 <T
NOV	BDL	BDL	.	.	.	BDL	.	BDL
DICHLOROBROMOMETHANE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)				
JAN	.150 <T	9.150	.	10.000	.	.	.	8.950
MAR	.050 <T	7.800	.	9.800	.	7.000	.	IU
MAY	BDL	8.200	.	8.450	.	7.350	.	8.300
JUL	BDL	7.350	.	9.400	.	IU	.	.
SEP	BDL	11.050	.	10.200	.	.	.	10.000
NOV	BDL	8.700	.	.	.	6.900	.	8.450
CHLORODIBROMOMETHANE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)				
JAN	.100 <T	4.800	.	5.000	.	.	.	4.700
MAR	BDL	2.900	.	4.300	.	2.500	.	IU
MAY	BDL	3.000	.	3.000	.	2.800	.	3.200
JUL	BDL	3.500	.	4.600	.	IU	.	.
SEP	BDL	5.100	.	4.900	.	.	.	5.100
NOV	BDL	4.400	.	.	.	3.500	.	4.400
BROMOFORM (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 350 (A1+)				
JAN	BDL	.600 <T	.	.800 <T	.	.	.	.600 <T
MAR	BDL	.400 <T	.	.400 <T	.	.600 <T	.	IU
MAY	BDL	.200 <T	.	.200 <T	.	.200 <T	.	.200 <T
JUL	BDL	.400 <T	.	.600 <T	.	IU	.	.
SEP	BDL	.600 <T	.	.600 <T	.	.	.	.600 <T
NOV	BDL	.600 <T	.	.	.	.400 <T	.	.600 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM NIAGARA FALLS WTP 1990

SITE TYPE		WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2		SITE 3
			STANDING	FREE FLOW	STANDING	FREE FLOW	STANDING	FREE FLOW
TOTAL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)			
JAN	BDL	28.950	.	30.350	.	.	.	28.500
MAR	BDL	22.000	.	28.700	.	20.050	.	IU
MAY	BDL	25.300	.	26.700	.	22.300	.	25.750
JUL	BDL	22.150	.	29.300	.	IU	.	.
SEP	BDL	35.750	.	33.100	.	.	.	33.600
NOV	BDL	24.900	.	.	.	19.550	.	24.800

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: P0C0D0 UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION: **NAME:** BENZENE
CAS#: 71-43-2
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L
SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).
CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).
PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).
SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)
Volatiles (duplicate) **(OPOPUP)**	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics **(OWOC) (OAPAHX)**	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.